rendered even more dangerous by reason of its great volatility, little has hitherto been done towards completing its chemical history beyond a mere description of its more evident properties. Determinations either of its density or its melting-point appear never to have been attempted, and it was with the object of supplying these deficiencies that the work in the Tübingen Laboratory was undertaken. Everyone who has ever prepared this exceptionally beautiful substance for lecture or other purposes will remember the exquisite manner in which it sublimes, forming long, delicate, colourless, but very highly refractive needles, bridging over from side to side of the wide tube or flask in which the operation is performed. Often these elongated prisms attain the length of half a dozen inches or more, and frequently form an interlacing network among which may be seen perched here and there star-shaped or flower-like aggregates of the smaller crystals. Perhaps the most remarkable property of these crystals is to be found in the manner in which they re-sublime from one side of the vessel to the other according as their position is varied as regards the direction of the light which falls upon them. Drs. Seubert and Pollard prepared their specimens by the old method first used by Sir Humphrey Davy, the action of iodine upon mercuric cyanide, $Hg(CN)_2 + 2I_2 = HgI_2 + 2CNI$. About 10 grams of the finely-powdered and well-dried mixture of iodine and cyanide of quicksilver, in the proportion of one molecule of each so as to avoid the presence of much free iodine in the sublimate, was placed in a wide test-tube and interpersed with glass beads in order to render the mixture as porous as possible. The test-tube was then placed at the bottom of a wider glass tube closed at the lower end, and fitted at the upper with a calcium chloride drying tube to prevent access of moisture. The apparatus was then allowed to stand for about three days in a position where it could receive direct sunlight; at the end of this time the reaction was almost complete, the mixture being brilliant red from formation of mercuric iodide. The lower end of the tube was then placed in a hot water bath, when the iodide of cyanogen sublimed in the manner above described into the upper cooler part of the tube. In order to determine the melting point, small quantities were placed in capillary tubes and hermetically sealed, for if the upper end were left open, as is usually the case in taking a melting-point, the cyanide would simply volatilize without fusion. The melting-point was in this way found to be 146°·5 C., and the solidifying point 143°. The vapour-density was determined by Victor Meyer's method, and found to be 5·28, corresponding to the simple formula, CNI. The lowest temperature at which the substance becomes completely and rapidly converted to the gaseous condition appears to be about 250°. The iodide is therefore analogous to the simple bromide and chloride of cyanogen, CNBr and CNCl, and not to the triple polymers tri-cyanogen bromide and chloride, $C_3N_3Br_3$ and $C_3N_3Cl_3$.

The additions to the Zoological Society's Gardens during the past week include the Wild Boars (*Sus scrofa* jv.) bred in Scotland, presented by the Lord Hebrand Russell; a Ring-tailed Coati (*Nasua rufa* ♂) from the Argentine Republic, presented by Mr. R. E. Moore; a Louisianian Meadow Starling (*Sturnella ludoviciana* ♀) from North America, a Black-bellied Sand Grouse (*Pterocles arenarius* ♀) from India, presented by Mr. W. H. St. Quintin; four variegated Sheldrakes (*Tadorna variegata* ♂ ♂ ♂ ♂) from New Zealand, presented by Captain C. A. Findlay, R.N.R.; a Rhomb-marked Snake (*Psammophylax rhombeatus*) from South Africa, presented by Miss Harris; three Common Vipers (*Vipera berus*) from Sussex, presented by Dr. C. W. Cousens; a Green Lizard (*Lacerta viridis*), a Three-toed Skink (*Seps tridactylus*) from France, presented Mr. J. C. Warbury; a Sooty Phalanger (*Phalangista fuliginosa* ♂) from Australia, deposited; a Black-headed Lemur (*Lemur brunneus*), born in the Gardens.

OUR ASTRONOMICAL COLUMN.

Objects for the Spectroscope.

Sidereal Time at Greenwich at 10 p.m. on May 8 = 13h. 6m. 42s.

Name.	Mag.	Colour.	R.A. 1890.	Decl. 1890.
			h. m. s.	° ′
(1) G.C. 3321 (64 M) ...	—	—	12 51 19	+22 17
(2) G.C. 3572 (51 M) ..	—	—	13 25 13	+47 45
(3) 40 Comæ Ber. ...	6	Yellowish-red.	13 1 0	+23 12
(4) 91 Leonis...	5	Whitish-yellow.	11 30 48	+ 0 11
(5) α Virginis	1	White.	13 9 24	−10 36
(6) V Virginis	Var.	Yellow-red.	13 22 7	− 2 36

Remarks.

(1) The spectrum of this bright nebula does not appear to have been yet recorded. Smyth describes it as "a conspicuous nebula, magnificent in size and brightness." In the General Catalogue it is described as "a very remarkable object; very bright; very large; very much extended in the direction 120°; brightens in the middle to a small bright nucleus, which is possibly a double star." The nebula is in the constellation Coma Berenices, and is now very favourably situated for observations.

(2) This is the famous spiral nebula in Canes Venatici. The details of the nebula are so well-known that a full description is not necessary here. In all but the largest telescopes it simply appears as a double nebula with the two nebulosities running into each other, one of them being surrounded by a ring which is variable in brightness. Smyth likens this to a "ghost" of Saturn. According to Huggins the spectrum is continuous, but some parts were thought to be abnormally bright. Although the observations will not be easy, it is very important that the positions of such bright parts should be measured, if only approximately. In such cases as this it is probable that we shall find spectroscopic connecting links between the bright-line nebulæ and stars which are well advanced in condensation. Our knowledge of the relations between nebulæ and comets is also likely to be advanced in this way.

(3) This is a very fine star of Group II. The bands are very wide and dark, even in the ultra-blue, but especially in the red (Dunér). The star belongs to a late stage of the group, and may be usefully re-examined for further details.

(4) A star of the solar type (Vogel). The usual differential observations as to whether the star is increasing in temperature (Group III.), or decreasing (Group V.) are required. The spectra of this class of stars should be very carefully examined for remnants of the strong bands in the red, which characterize the later stages of Group II., and which are also seen in Aldebaran. If these are found, the star is obviously at an early stage of Group III. It has also become very important to determine whether there are any stars intermediate between stars like the sun and stars of Group VI., and in these more detailed observations this should be borne in mind. The carbon band near *b* will probably be the first to appear, and the presence or absence of traces of this band should be always noted. It is most likely to occur in stars of an orange or reddish tint.

(5) Spica has a spectrum of Group IV. The only observations likely to be of service are those comparing the thicknesses of such lines as *b*, E, and D with their thickness in other bright stars of the same group (*e.g.* α Lyræ). This will determine its relative temperature.

(6) This variable will reach a maximum about May 9. It ranges in magnitude from 8–9 at maximum, to < 13 at minimum in a period of about 251 days. The spectrum is still doubtful; Gore writes it III.? A. Fowler.

Structure of the Corona.—The Smithsonian Institution has had two plates prepared, containing nine photographs of the total eclipse of the sun of January 1, 1889, and distributed them amongst astronomers and others interested in solar physics. All the photographs have been reduced to a uniform diameter, and at Prof. Langley's request, Prof. Todd has contributed a descriptive note to accompany them. In the remarks on the structure of the corona it is noted:—

(1) The axis of symmetry of the corona does not coincide with the axis of revolution of the sun as determined from the solar

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spots. The corona appears to be at least a triple phenomenon made up of—

(*a*) The polar rays, seen most prominently about the poles.

(*b*) The inner equatorial corona, the lower regions of which bear some resemblance to an outer solar atmosphere.

(*c*) The outer equatorial corona, consisting of the long streamers for the most part only visible to the naked eye.

(2) The polar corona consists of rays, straight or nearly so, and radial from neither the sun's centre nor the sun's poles. Rather they seem to radiate from areas the centres of which are adjacent to the sun's poles.

(3) The inner equatorial corona emits a large percentage of the total light of the corona; the streamers, however, are not generally so sharply defined as about the poles, and many of them appear to have a real curvature. Four large prominences are visible at about 35° of solar latitude, as if to suggest some connection between the protuberances and the corona.

(4) The equatorial streamers of the corona are very slightly curved, being convergent on the east side of the sun, and divergent on the west.

The fact of chief importance established appears to be the periodicity of the outer corona in a cycle probably of equal duration with that of the solar spots. The epoch of greatest extension of the equatorial corona appears to coincide very nearly with the epoch of minimum sun-spots.

Prof. Todd also directs attention to the most important points requiring elucidation, and throws out a few suggestions for future eclipse observations.

BROOKS'S COMET (*a* 1890).—The following ephemeris has been computed by Dr. Bidschof (*Astr. Nach.*, No. 2966), and is in continuation of that previously given (NATURE, vol. xli. p. 571):—

Ephemeris for Berlin Midnight.

1890.	R.A.			Decl.		Log *r*.	Log Δ.	Brightness.
	h.	m.	s.	°	′			
May 6 ..	20	53	21	+34	9·6	0·2874	0·2596	2·60
10...		46	41	37	44·1	0·2857	0·2449	2·80
14...		38	9	41	28·5	0·2843	0·2314	3·00
18 ..		27	13	45	20·2	0·2832	0·2195	3·18
22...		13	16	49	14·9	0·2824	0·2096	3·34
26...	19	55	28	53	6·2	0·2818	0·2022	3·47
30...		32	54	56	46·1	0·2815	0·1976	3·55

The brightness at discovery (March 21) has been taken as unity.

DISCOVERY OF MINOR PLANETS.—Two more asteroids were discovered by Herr Palisa, at Vienna, on April 25, and observed independently by M. Charlois, at Nice, on the following night. The magnitudes of the planets are 13 and 12 respectively, and their numbers are (291) and (292). Prof. Krueger thinks that the latter is probably Scylla (*Astr. Nach.*, 2966).

THE INSTITUTION OF MECHANICAL ENGINEERS.

AN ordinary general meeting of the Institution of Mechanical Engineers was held on the Thursday and Friday of last week; the President, Mr. J. Tomlinson, in the chair.

The second meeting of the year is not generally looked on as of great importance, but it is a long time since we remember one of such meagre proportions in one respect as that with which we are now dealing, for there was only one paper on the agenda; that and the President's address constituted the whole programme. What the proceedings lacked in variety and amplitude was, however, fully compensated for in solid value. The one paper, Prof. Kennedy's, is full of valuable information, and Mr. Tomlinson's address came as a most welcome surprise to a good many. In the first place it was short, and, secondly, it was practical—two virtues which appeal strongly to engineers when there is talking to be done; but beyond that it was one of the most interesting Presidential addresses we have heard for many a day at any of the Engineering Societies. The reason for this is not far to seek. Mr. Tomlinson simply narrated his own experience in plain language, eschewing those ornamental tags of rhetoric which many people look on as essential when they have to speak in public; and as his experience extends back to a very interesting period of railway engineering, the address proved an exceptionally happy effort.

Mr. Tomlinson has been, as he said, a railway man all his life; and, indeed, he has been connected with the engineering departments of more than half a dozen railways, from the Stockton and Darlington up to the Metropolitan. His father was passenger superintendent to the former line. His recollection therefore carries him back to the very early days of the locomotive. His first knowledge extends to the year 1837, when he was employed at the works of Timothy Hackworth, of Shildon. Perhaps no better instance could be given of the simplicity of those Arcadian days than the fact that Hackworth was at once locomotive superintendent and contractor to the railway. Such a dual position might cause invidious remarks on the part of shareholders in the present day. Mr. Tomlinson remembered the three original locomotives placed on the Stockton and Darlington line. One of them, the *Locomotive*, now stands on a pedestal in front of the North Road Station at Darlington. The load for this engine was about 22 tons of empty waggons to draw up hill; whilst down the hill to Middlesborough the waggons loaded, weighing 64 tons, were drawn. The weight of the engine and two tenders loaded was about 15 tons. Unfortunately there was no record kept of the consumption of fuel, but Mr. Tomlinson used to help put the coal on the tender, and he estimates the quantity to have been 16 to 17 cwts. for 48 miles, or about 40 lbs. per engine mile; but it must be remembered that the gradient was all in favour of the load—in fact, the greater part of the fuel was consumed on the return journey of empty trucks. The cylinders were 10 inches in diameter by 24 inches stroke. The eccentrics had to be changed for back and forward gear by hand, the boiler pressures were 30 to 35 lbs. per square inch, and the pistons were packed with a spun-yarn gasket. As the cylinders were vertical there were necessarily no engine springs. There were no brakes, no water-gauge glass, no head or tail lamps, and no whistle. We have not space to follow Mr. Tomlinson in his interesting engineering reminiscences. Perhaps, since Mr. T. R. Crampton has gone, there is only one other engineer living who could give us such unique personal experience of early locomotive days. If so, that engineer is Mr. E. Woods, Past-President of the Institution of Civil Engineers.

Prof. Alexander Kennedy's paper constituted the second report of the Research Committee appointed by the Council of the Institution to investigate the Marine Engineering question. Within the last few years the Institution has made quite a special feature of these research committees, and we know of no better way in which it could carry out the object of its existence, and, at the same time, keep down the ever-growing financial surplus. The Research Committee on Friction and the Research Committee on Rivetting would have been of great service to engineers if only from the fact that they collected and put in concise form the knowledge already existing on the subjects; but they did more than this, for they made experiments of their own by which doubtful points were cleared up and new possibilities were suggested. The Marine Engine Committee are following the same useful course under the guidance of their Chairman, Prof. Kennedy, who, it may be remarked, gained his first experience as an engineer in the once celebrated Thames-side marine engineering establishment of the Dudgeons.

As we have said, this is the second report of the Committee, the first, which was read last year, being on the trials of the s.s. *Meteor*, a London and Edinburgh steamer of 692 registered tons. The vessels since then under trial, and dealt with in the second report, are the *Fusi Yama*, the *Colchester*, and the *Tartar*. The first is an ordinary trading vessel of 214·3 feet long b.p., 29·3 feet beam, 20·5 feet deep, and of 2175 tons displacement at trial draught. The trial run was from Gravesend to Portland. The engines are by Samuelson, of Hull, and had just been overhauled. They are of the ordinary two-cylinder compound type. The *Colchester* is the latest built vessel of the Great Eastern Railway on the Antwerp service. She is 281 feet long, 31 feet beam, and 15·2 deep. Her trial displacement was 1675 tons. She is a twin-screw ship, the engines being ordinary two-cylinder compounds. The trial run was from the Humber to Harwich, the engines having been overhauled in the former river. The *Tartar* was selected as an excellent example of modern economical engines in a cargo-carrying steamer—what is generally known as an "ocean tramp." She is 332 feet long, 38 feet wide, and 27 feet deep. Her displacement tonnage on trial was 2250 tons. She has triple compound engines of the three-crank type. The trial run was from the Thames to Portland. The vessel was light, so that the engines were working at very low power, and, in addition to this, bad weather was met

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